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(54) Tamper-proof one-piece seal

(57) A tamper-proof one-piece seal of the type comprising a dished cover portion (2) and a dished main portion (1) which can be pressed into one another to form an enclosed hollow space, a catch (15) being provided on the cover portion (2) and a locking element in the form of a slot (11) being provided in the main portion (1) so that the catch (15) penetrates through the slot (11) to unseparably latch both portions together in the closed position of the seal, is modified in that the slot (11) is formed on a surface of a casing (10) which is enclosed on all sides and which serves to accommodate the catch (15) in a tamper-proof manner.

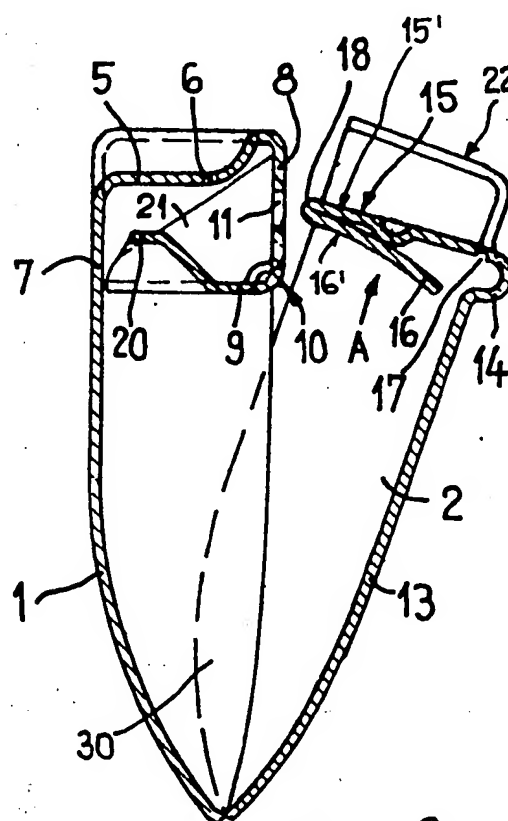
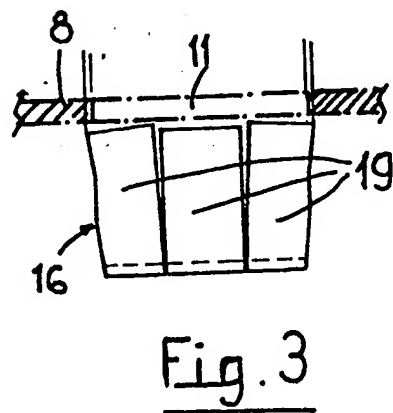
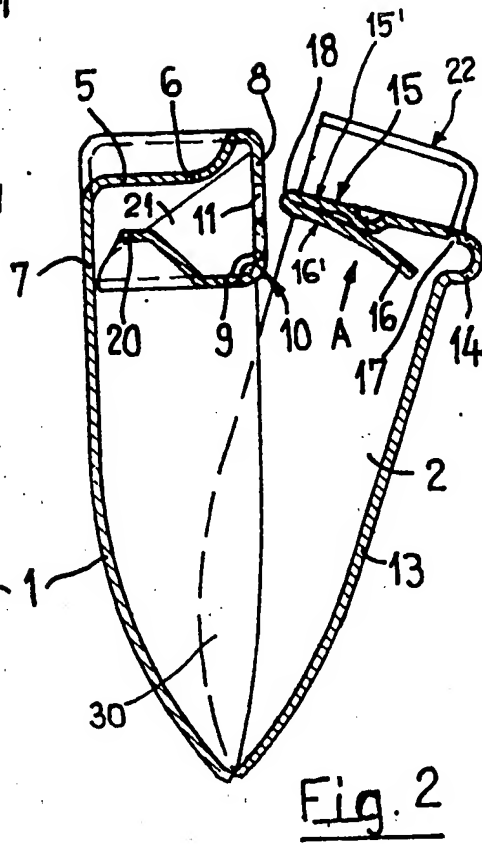
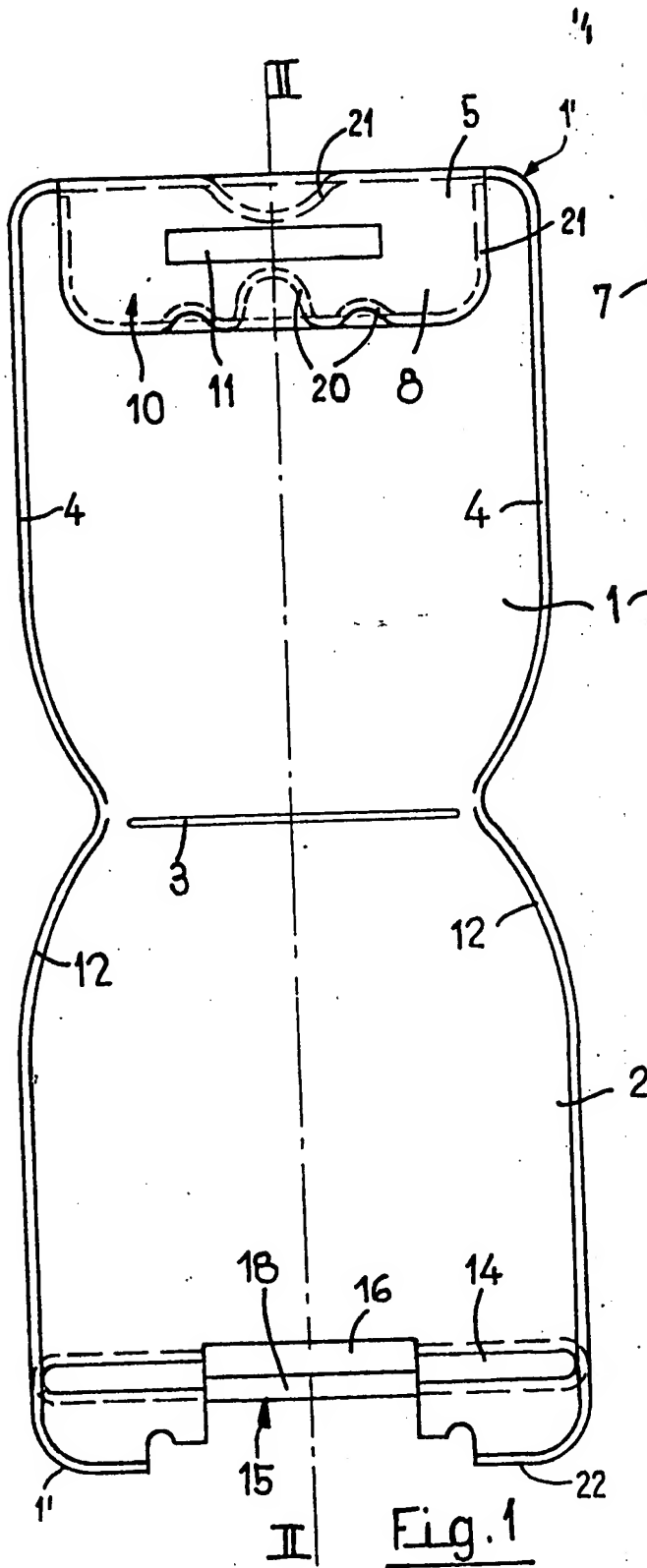


Fig. 2

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SPECIFICATION

Tamper-proof one-piece seal

- 5 The present invention broadly relates to a tamper-proof one-piece seal or seal blank, such as a sheet metal seal blank, for sealing elements or members to be sealed such as, for example, cords, wires, straps and so forth.
- 10 Generally speaking, the one-piece seal comprises a dished or shell-like cover portion and a dished or shell-like main portion. To close the one-piece seal, both dished portions are capable of being pressed into one another by
- 15 bending the one-piece seal along a fold line or notch of reduced resistance in such manner that they form a hollow space which is enclosed on all sides. A catch or latching element is provided on the dished cover portion
- 20 and a closure or locking element in the form of a slot is provided in the dished main portion. While closing the one-piece seal, the catch or latching element penetrates through the locking element or slot and thereby
- 25 latches together in an unseparable manner both dished portions in the closed position of the one-piece seal.

- Such one-piece seals constitute an article characteristically produced in bulk. They are
- 30 generally produced from a strip of substantially rigid but bendable material such as sheet metal by stamping or punching processes and bending processes and are fastened to binding elements or means for protection or security
- 35 reasons. They are inexpensive to produce and can easily be closed by hand and without a tool. Simultaneously, strict requirements for the reliability of the connection are demanded. In particular, unauthorized manipulation of
- 40 closed one-piece seals should be prevented as far as possible, or should at least cause visible damage of the one-piece seal which would allow the unauthorized intervention to be detected.

- 45 A one-piece seal of the aforesaid type is described in the Swiss Patent No. 282,240, published August 1, 1952. By bending upwardly and inwardly a flange of the main portion, the end of the flange forms a closing
- 50 plate which is parallel to the base surface of the main portion and separable by a predetermined distance therefrom and which comprises a slot for the penetration of a catch or latching element while closing the one-piece
- 55 seal.

- A similar one-piece seal is known from the Swiss Patent No. 341,431, published November 14, 1959, which differs in particular from the one-piece seal of the aforesaid Swiss Patent No. 282,240 by a different embodiment
- 60 of the closure or latching member. An inwardly bent front or face flange of the main portion, similar to the one-piece seal according to the Swiss Patent No. 282,240, is provided
- 65 with downwardly bent tongues or clasps.

- 70 Flange portions or flaps are fastened to the side or lateral flanges of the cover portion and are bent inwards towards each other. While pressing the cover portion into the main portion, these flaps slide downwards laterally along the tongues or clasps and thereby bend these inwardly. As soon as the flaps leave or separate from the lower edges of the tongues or clasps, the lower edges of the tongues or clasps resiliently return, thereby latching or locking the one-piece seal in its closed position.

- With both of the aforesaid known one-piece seals, the catch or latching members freely
- 80 project into the comparatively large hollow space of the casing defined by the main portion and the cover portion when these seals are closed. It has been observed that such one-piece seals are relatively easily manipulable by adept or skillful persons by spreading the cup-shaped portions of the closed one-piece seal somewhat apart. Thereafter, the locking or latching elements, which are now accessible within the interior of the seal, can
- 85 be opened with a fine object, for example a flat implement, such as a rod or similar object, without damaging the seal. With some dexterity it is even possible, for example, to open the known one-piece seals from the outside
- 90 through the open corners of the main portion and the cover portion without visible damage such that they can thereafter be closed again without such manipulation being detectable.

- This bulk-produced article is thus capable of
- 100 being improved, especially with regard to security and protection against unauthorized manipulation or tampering.

- Therefore, with the foregoing in mind, it is a primary object of the present invention to provide a new and improved construction of a tamper-proof one-piece seal which does not exhibit the aforesaid drawbacks and shortcomings of the prior art constructions.

- Another and more specific object of the
- 110 present invention aims at providing a new and improved construction of a tamper-proof one-piece seal of the previously mentioned type which represents a significant improvement with respect to security and protection against
- 115 unauthorized tampering or manipulation while maintaining all advantages and also maintaining substantially the same outer form of the previously known embodiments.

- Yet a further significant object of the present invention aims at providing a new and improved construction of a one-piece seal of the character described which is relatively simple in construction and design, extremely economical to manufacture, highly reliable in operation, and not readily subject to tampering
- 120 without detection.

- Now in order to implement these and still further objects of the invention, which will become more readily apparent as the description
- 125 proceeds, the one-piece seal of the present
- 130

invention is manifested by the features that the closure or locking element is formed on a surface of a box or casing which is enclosed on all sides and which serves specifically for accommodating the catch or latching element within the hollow space of the one-piece seal which casing, when the one-piece seal is closed, is likewise enclosed on all sides including the corners.

- 10 In this manner, a further hollow space which is completely enclosed on all sides is formed within the enclosed hollow space between both dished portions of the one-piece seal. This further hollow space is designed specifically for accommodating the catch or latching element, thereby forming a further obstacle to unauthorized manipulation which practically eliminates the possibility that such manipulation can be accomplished without destroying the seal or at least visibly damaging the same.

An especially simple fabrication is possible if the enclosed box or casing for accommodating the catch or latching element is formed by means of triple inward bendings of a flap which projects from the dished or shell-like main portion of the one-piece seal.

- In a preferred embodiment of the one-piece seal according to the invention, the closure or locking element is a slot and the catch or latching element is a strip-like member bent from a tongue of the dished cover portion. This tongue has an outwardly projecting free end which resiliently deforms during penetration through the slot during closing the one-piece seal and which resiliently returns to its original form or shape within the box or casing when the one-piece seal is closed, thereby making withdrawal of the catch or latching element from the slot impossible. For further security and protection from unauthorized manipulation, a corrugated or reinforced pleat or gooseneck as well as a predetermined breaking region or notched region are formed at the transition region from the cover portion to the catch or latching element.

- If, moreover, according to a further embodiment of the invention, the outwardly projecting free end of the catch or latching element is formed from fan-like spread flaps, whose total width surpasses the length of the slot, then an additional anchoring or securement of the catch or latching element results in the closed state of the one-piece seal. This occurs because the catch or latching element is also additionally deformed in its main or major plane while penetrating through the slot and thereafter resiliently returns within the box or casing to its original form. Finally, indentations projecting into the box prevent a downward pitching or tipping of the catch or latching element when the one-piece seal is in its closed state.

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given

to the following detailed description thereof. Such description makes reference to the annexed drawings wherein throughout the various figures of the drawings there have been generally used the same reference characters to denote the same or analogous components and wherein:

- Figure 1 is a top plan view of an open one-piece seal in its unclosed state and constructed according to the invention;

- Figure 2 is a section along the line II-II of Figure 1 through the one-piece seal in a partially closed position; and

- Figure 3 is a view looking in the direction of the arrow A in Figure 2 of one possible construction of the outwardly extending free end of the catch or latching element.

- Describing now the drawings, it is to be understood that to simplify the showing thereof only enough of the structure of the one-piece seal has been illustrated therein as is needed to enable one skilled in the art to readily understand the underlying principles and concepts of this invention. Turning now specifically to Figure 1 of the drawings, the tamper-proof one-piece seal illustrated therein by way of example and not limitation will be seen to comprise a seal manufactured by stamping or punching and bending a single piece of suitable bendable material, such as sheet metal. This tamper-proof one-piece seal comprises a main portion 1 as well as a cover portion 2, both of which have dished or shell-like forms or configurations as a result of the bending or flanging of their rims. The material of the one-piece seal is reduced in thickness by a notch or groove region or fold line 3 along the bend at which the dished or shell-like main portion 1 makes the transition to the dished or shell-like cover portion 2 for creating a region of reduced bending resistance. By bending together the main portion 1 and the cover portion 2 while closing the one-piece seal, the main portion 1 and the cover portion 2 engage each other and form a hinged or folded box-like structure which accommodates and completely surrounds the ends of a not particularly shown packing string or cord or similar object to be sealed. The thickness reduction of the bend by the notch or groove region or fold line 3 is designed such that the one-piece seal can be closed without breakage or rupture of the bend, yet such that the seal material along the bend will break if, for example, it is attempted by unauthorized manipulation or tampering to again pry open the sealed portions of the closed one-piece seal.

- The dished main portion 1 possesses rims which are flanged or bent up and deep-drawn over its corners 1, in order to continuously form side edges 4 as well as a flap portion 5 on the front end or face. This flap portion 5 is inwardly bent by 90° three times such that it forms a front plate or wall 8 of the dished main portion 1, a closure plate 8 extending

substantially parallel to a base surface 7 of the dished main portion 1 at a distance or spacing thereto and an end plate 9 reaching from this closure plate 8 to the base surface

5 7. The closure plate 8 has a slot 11 defining a locking element for receiving a catch or latching element 15. Together with a flange 21 formed on the end plate 9 and bent back towards the front plate or wall 8, the flap

10 portion 5 thus folded or bent forms a box or casing or box-like casing 10 which is enclosed on all sides and wherein the closure plate 8 defines an outer surface or face 8 of this box or casing 10. This box or casing 10, as will

15 be described hereinafter, serves to specifically accommodate the catch or latching element 15 of the tamper-proof one-piece seal when the seal is closed, thus making it inaccessible from the outside.

20 The dished cover portion 2 likewise possesses a rim which is bent up and deep-drawn over the corners and which forms side edges 12 which rest on the outside of the side edges 4 of the main portion 1 when the

25 one-piece seal is closed. The cover portion 2 has a front plate or wall 22 provided with a tongue or tongue-like projection 15' which forms a somewhat snap-like catch or latching element 15. This catch or latching element 15

30 is formed by being bent at right angles from a base surface 13 of the cover portion 2 while forming a corrugated or reinforced pleat or gooseneck 14. This catch or latching element 15 is also formed by bending back its end

35 region 18' towards the base surface 13 as well as by outwardly bending or spreading its free end 16. Outwardly bending or spreading the free end 16 produces a bent snap-like configuration of the tongue-like projection 15' defining the latching element 15. As can be

40 seen in Figure 3, the free end 18 of the catch or latching element 15 is preferably formed by a plurality of fan-shaped, spread flanged projections or flaps 19, three of which are shown

45 here, whose total width slightly exceeds the length of the slot 11, indicated here in Figure 3 by a dotted and dashed line.

At the entrance position of the catch or latching element 15 into the hollow space of the cover portion 2, i.e. at the location of the gooseneck 14, there is located a notch or groove region 17 which allows the catch or latching element 15 to break off, at this location if manipulation or tampering occurs on

50 the closed one-piece seal with the intention of opening the one-piece seal by deforming the catch or latching element 15. The catch or latching element 15 thereafter falls into an unaccessible portion of the box or casing 10 of the main portion 1. When closing the one-piece seal the catch or latching element 15

55 penetrates through the slot 11 into the box or casing 10. When the free end 18 penetrates through the slot 11, the catch or latching element 15 is resiliently pressed together or

compressed. After penetration through the slot 11, the catch or latching element 15 springs or resiliently returns back to its original form within the interior of the box or casing 10 and can no longer be pulled out. Attempts to do so lead to a breaking off of the catch or latching element 15 at the notch or predetermined breaking region 17. Indentations 20 projecting into the box 10 a box-like casing prevent a downward depression or tipping of the catch or latching element 15 when the one-piece seal is closed. The dished cover portion 2 and the dished main portion 1 with the side edges 4, the flat portion 5 and the corners 1' enclose a hollow space 30 which is closed on all sides.

It is known that sheet metal is eminently capable of being deep-drawn but is not very resilient. In order to provide the catch or latching element 15 with enough resiliency to guarantee that it will resiliently return to its original shape after its deformation which occurs when penetrating through the slot 11 so that the one-piece seal can no longer be

85 opened, the material of the catch or latching element 15 and especially a bend or flexure 18 are preferably both mechanically cold worked so that the original soft and permanently plastically deformable material of the one-piece seal becomes harder but also elastically resilient at this location. It will be understood that the inventive tamper-proof seal could also be fabricated by other means from other materials, such as molded from plastic.

While there are shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto, but may be otherwise variously embodied and practiced within the scope of the following claims.

CLAIMS

1. A one-piece seal for the tamper-proof sealing of members to be sealed, such as cords, wires, strips and the like, comprising:
 - a dished cover portion;
 - a dished main portion;
 - said dished cover portion and said dished main portion being joined at a fold line of reduced thickness;
 - said dished cover portion and said dished main portion being constructed to permit pressing together for closing the one-piece seal by bending along said fold line such that said dished cover portion and said dished main portion conjointly form a hollow space having corners;
 - said hollow space including said corners and formed by said dished cover portion and said dished main portion being closed on 11 sides when the one-piece seal is closed;
 - said dished cover portion comprising a catch element;
 - said dished main portion comprising a slot defining a locking element for said catch element;

- said catch element penetrating said locking element when said one-piece seal is closed for inseparably latching together said dished cover portion and said dished main portion in a closed position of the one-piece seal;
- 5 said dished main portion comprising a substantially box-like internal casing enclosed on all sides and presenting an outer surface;
- 10 said locking element being formed on said outer surface of said box-like casing; and said hollow space having corners; and said outer surface of said box-like casing serving for accommodating said latching element within said hollow space.
- 15 2. The one-piece seal as defined in claim 1, wherein:
- said dished main portion comprises a triply inwardly bent flap defining said box-like casing for accommodating said latching element; and
- 20 said flap being formed integrally with said dished main portion of the one-piece seal.
3. The one-piece seal as defined in claim 1 or 2 wherein:
- 25 said locking element comprises said slot;
- said dished cover portion of the one-piece seal having a tongue-like projection defining said latching element which possesses a bent, snap-like configuration;
- 30 said tongue-like projection of said dished cover portion of the one-piece seal having an outwardly extending free end;
- said free end of said tongue-like projection being resiliently deformed from a predetermined original shape when penetrating through
- 35 said slot while closing the one-piece seal; and said free end of said tongue-like projection resiliently returning to said predetermined original shape within said box-like casing when the one-piece seal is closed and prohibiting a withdrawal of said latching element from said slot.
4. The one-piece seal as defined in any preceding claim, wherein:
- 45 said latching element has a bend region; and said latching element being mechanically cold formed at least at said bend region for enhancing its resilient elastic properties.
5. The one-piece seal as defined in any preceding claim, wherein:
- 50 said latching element comprises a pleat and a transition region;
- said pleat being formed at said transition region between said dished cover portion of the one-piece seal and said latching element
- 55 of said dished cover portion of the one-piece seal; and
- a predetermined breaking region formed at said transition region between said dished cover portion and said latching element.
- 60 6. The one-piece seal as defined in any preceding claim, wherein:
- said slot defined by said catch element has ends formed by fan-like spread flap projections; and
- 65 the total width of said fan-like spread flap

projections being greater than the length of said slot.

7. The one-piece seal as defined in any preceding claim, wherein:

- 70 said box-like casing is provided with indentations projecting into said box-like casing; and

said indentations prohibiting depression of said latching element when the one-piece seal is closed.

- 75 8. A one-piece seal substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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